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A SEEDLING MEASUREMENT BOARD

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* - This series of publications releases data gathered in connection with investigations being carried on at the Southern Station. The information contained in them is subject to correction or amplification following further investigation. - Editor

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Problem

In obtaining results of various studies in the nursery, it is necessary to secure measurements of height, stem diameter, root length, and extent of root system in order to compare different treatments. It is, of course, possible to do this by simply taking a sample of trees from each plot, measuring these samples, and discarding the trees measured because they have dried out. The trees to be planted in the field follow-up, then, must be taken from the remainder of the plot. More desirable than this method would be one whereby the measured trees could be used in the field planting. Taking a large number of measurements is very time-consuming and therefore costly. For this reason a method which reduces the time would be decidedly helpful.

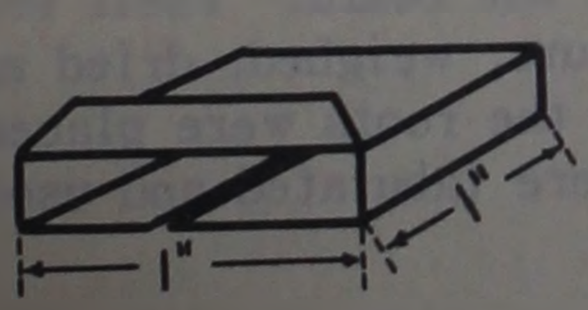
Methods

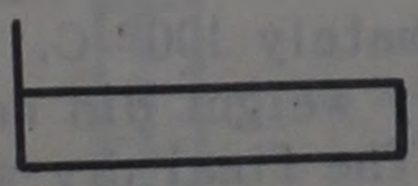
General description of the board

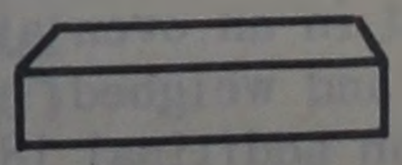
In order to meet the requirements just outlined, a seedling-measurement board as shown in the accompanying illustration was designed. The seedling is placed on this board and in a single operation the height, stem diameter, root length, and root extent can be obtained and tabulated.

In constructing this board, two pieces of Masonite Presdwood, 24" x 36" and 1/4" thick, were bolted together with eight small stove bolts. The board was then painted white, and the scales and circles inked on. To aid in getting the stem-diameter measurements, a small caliper arrangement was built in the following manner:

Two slits were cut along the sides of the vertical scale, through the upper board. A piece of black lacquered tin (taken from a film-pack holder) was bent to form a stiff sliding barrier.




SIDE VIEW


END VIEW

This slide was then inserted through the two slits, and bent into place so that it could be moved back and forth along the scale.

Two small finishing nails were placed at the zero of the stem-diameter scale

The entire board was shellacked and, when dry, was ready for use.

Design and use of the board

As seen from the illustration, the scales start at zero, the ground line on the seedling, in the middle of the board. To the left is the scale in centimeters for measuring top length. Above this zero mark is a vertical scale for stem diameter. The root length is measured along the right-hand scale. The root number, which represents the extent of the root system, is obtained from the concentric semi-circles. The seedling is placed on the board with the ground line at the zero mark and the roots are spread out in a flat plane, in as close to their natural position as possible. The stem diameter is obtained by moving the slide tightly against the stem (the far side of which is against the two nails) and the scale is read where the slide rests (just as in the case of obtaining tree diameters with calipers). The number of roots (longer than 2 centimeters) ending in each circle are counted and tallied. Thus a seedling may have three roots ending in circle 1, eleven in 2, two in 3, two in 4, and one in 5. These numbers are then multiplied by the radius which is half-way between the radii of the two semi-circles which bound the band in question. Thus, in the instance above, 3 is multiplied by 2, 11 by 6, 2 by 10, 2 by 14, and 1 by 18. These products are then totaled to obtain the "root number," which in this case is 6 + 66 + 20 + 28 + 18, or 138. The seedlings are graded into 1, 2, and 3, according to Wakeley's grading classification[1], and the grade is tallied.

Below is given the form which is used for tallying all measurements.

RS-SS
F
Palustris
Fn

SEEDBED MEASURMENTS

Date_____

Study_____

Party_____

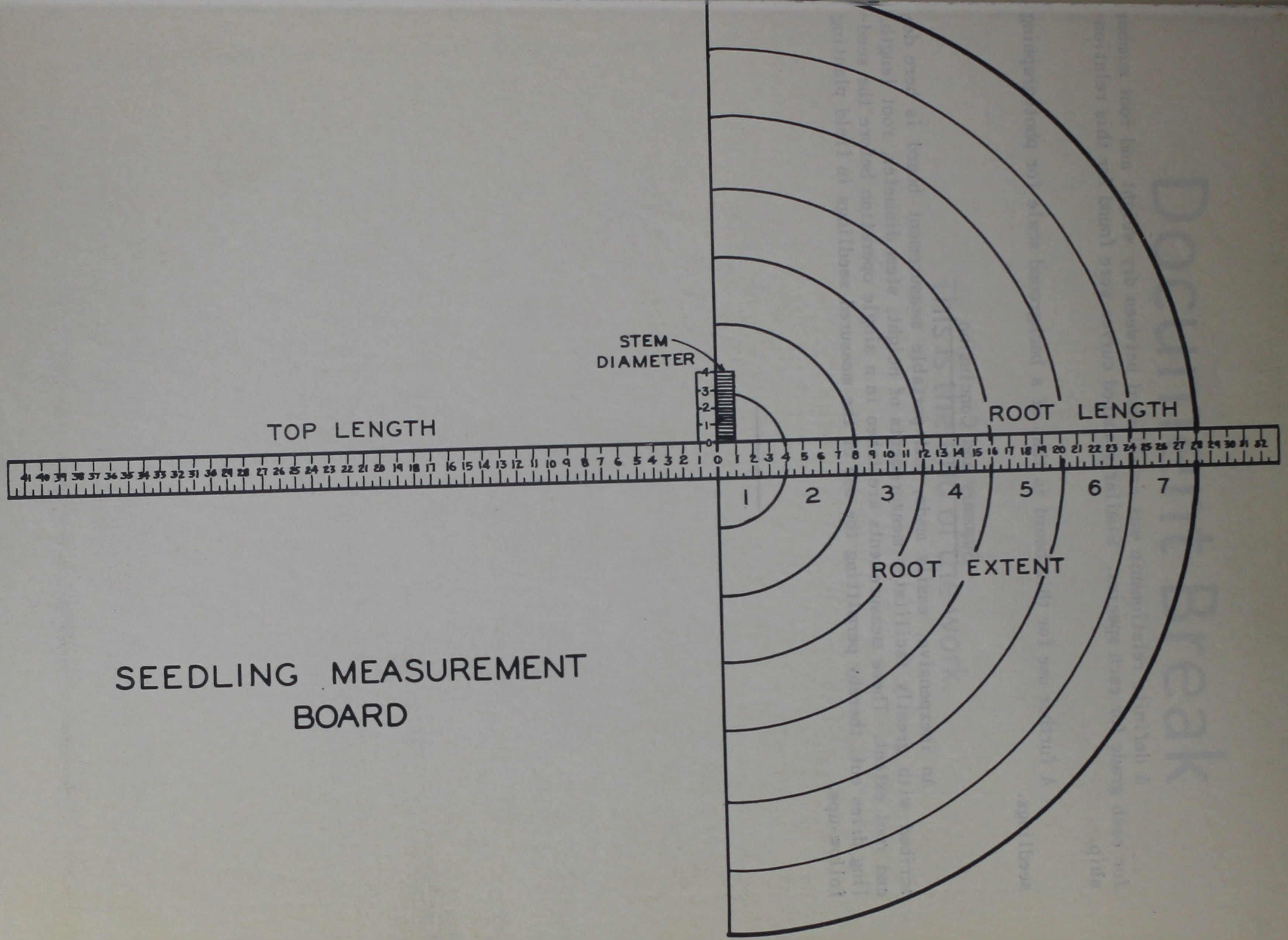
Species_____

Block_____, Section_____, Compartment_____. Exp. Bed No._____ Plat_____

Seedling No.	Top length cm.	Stem diam. cm.	Root length cm.	Root extent							Grade			Notes and computations
				1	2	3	4	5	6	Total	1	2	3	

In order to check the reliability of the root number as an indication of extent of root system, this root number was compared with oven-dry weight of the root system. For this purpose 100 seedlings of each of the three species grown in the nursery--longleaf, slash, and shortleaf--were measured on the board. Their roots were then dried in an oven at approximately 100° C. for 24 hours, weighed, dried again for 18 hours, and weighed. If the dry weight did not check, the roots were placed in the oven for an additinal 18 hours. The final dry weights were tabulated and used in the computations.

[1] This classification is given in detail in a manuscript on forest planting in the South, now awaiting publication.



SEEDLING MEASUREMENT
BOARD

A definite relationship was established between dry weight and root number for each grade for each species. Similarly shaped curves were found for this relationship.

A further use for this board is that of a background scale for photographing seedlings.

Summary and Conclusion

An inexpensive, easily made, and portable measurement board is here described with greatly facilitates measurements of height, stem diameter, root length, and root extent. These measurements are taken in a single operation before the seedling dries out, thereby permitting the use of the measured seedlings in field planting follow-ups.